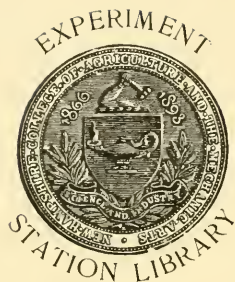


SHOUT
SHARE **IT**





Class.....639.73.....

Number.....N53.....

Volume.....1 cap. 2.....

Source.....

Received.....

Cost.....

Accession No. 14101.....

NEW HAMPSHIRE COLLEGE
AGRICULTURAL EXPERIMENT STATION

REMEDIES FOR FLEA-BEETLES

BY CLARENCE M. WEED



Tomato Leaf Injured by Flea-beetle.

NEW HAMPSHIRE COLLEGE
OF
AGRICULTURE AND THE MECHANIC ARTS
DURHAM, N. H.

NEW HAMPSHIRE COLLEGE
OF
AGRICULTURE AND THE MECHANIC ARTS

AGRICULTURAL EXPERIMENT STATION

DURHAM, N. H.

BOARD OF CONTROL

HON. GEO. A. WASON, *Chairman*, New Boston.
PRES. CHAS. S. MURKLAND, *ex-officio*, Durham.
CHARLES W. STONE, A. M., *Secretary*, Andover
HON. JOHN G. TALLANT, Pembroke.
HENRY W. KEYES, A. M., Haverhill.

THE STATION COUNCIL

PRESIDENT CHAS. S. MURKLAND, *Acting Director*.
HENRY E. ALVORD, C. E., *Agriculturist*.
CHAS. H. PETTEE, A. M., C. E., *Meteorologist*.
FRED W. MORSE, B. S., *Chemist*.
HERBERT H. LAMSON, M. D., *Bacteriologist*.
CLARENCE M. WEED, D. Sc., *Entomologist*.
LEIGH HUNT, *Horticulturist*.

ASSISTANTS

EDWARD P. STONE, B. S., *Assistant Chemist*.
FRED D. FULLER, B. S., *Assistant Chemist*.
RUEL S. ALDEN, B. S., *Farm Superintendent*.
RICHARD FITZGERALD, *Clerk*.

The Bulletins of this Station are sent to any resident of New Hampshire upon application,

REMEDIES FOR FLEA-BEETLES

BY CLARENCE M. WEED

During recent years great annoyance has been caused many farmers and gardeners in New England on account of the injuries due to small jumping insects that appear in spring upon a great variety of young crop plants, eating out small circular portions of its leaves. These insects are called flea-beetles, because of their habit of jumping when disturbed. The most abundant species is the so-called Cucumber Flea-beetle*—a small, black, hard-shelled insect scarcely one-twelfth of an inch long. Its common name is hardly an appropriate one, for it seems no more partial to plants of the cucumber family than to many others. It commonly attacks with destructive effect potatoes, tomatoes, egg-plant, radish, turnip, cabbage, raspberry, sunflower and other plants, as well as the various members of the squash family. It feeds almost exclusively upon thick leaved plants, and is more likely to attack the relatively thick cotyledons or first leaves than those appearing later. This is easily explained by its habit of gnawing the surface of the leaf; when the parenchyma or green part is thick and succulent more food is available than when the leaf is thin.

Apparently the life-history of this insect has not as yet been very completely worked out. So far as now known the essential facts may be briefly summarized thus: The beetles deposit eggs, presumably upon the leaves of the food plants, which hatch into little grubs that become leaf-miners—living within the tissues of the leaves. Probably they drop to the ground to change to the pupa state, emerging shortly afterwards as adult beetles again. In New England there are evidently two broods of beetles each season, one appearing early in Spring and the other a little after midsummer. The first brood attacks early vegetables most severely, while the presence of the second is most likely to be shown by injuries in the potato field. The most serious losses are undoubtedly caused by the attacks upon potatoes.

**Crepidodera cucumeris*.

There is another species of flea-beetle that frequently injures vegetables—especially cabbages, turnips, radishes and other related plants. It is commonly called the Striped Flea-beetle*. It is represented magnified at Fig. 3, *b*, and is a small, shining black beetle, one-tenth of an inch long, with a broad, yellow, wavy, longitudinal stripe on each wing-cover. It feeds upon the surface of the leaf, gnawing out little pits. The females deposit their minute, oval, whitish eggs upon the roots of various cruciferous plants, such as radish, cabbage, turnip, etc., and the larvæ which hatch from them feed upon these roots, sometimes doing serious damage in this way. The full-grown larva (Fig. 2, *a*) is about one-fourth of an inch long, with a yellowish-white body and brown head. There appear to be two or more broods each season.



Fig. 2. Wavy-striped Flea-beetle: *a*, larva; *b*, beetle. Magnified

REMEDIES

A large number of substances have been recommended as preventives of flea-beetle attack, success in the use of any of which depends, to a great extent, upon the comparative abundance of the insects. Our own experiments indicate that the pests may be driven off from garden vegetables, in early Spring, by the liberal application of simple repellant and deterrent substances like plaster, air-slaked lime, soot, and especially tobacco powder, dusted on when the plants are wet with dew.

I obtained more satisfactory results, however, by the use of a spray of lime wash made by adding a pint or more of freshly slaked lime to two gallons of water, and then thoroughly mixing in about half a teaspoonful of Paris green. I sprayed this upon a variety of garden crops with excellent results. The lime dries on in a firmer coating than when simply dusted on, and consequently is more effective.

A still more certain remedy is found in the use of the Bor-

* *Phyllotreta vittata*.

deaux mixture. The importance of this fungicide for this purpose appears first to have been fully demonstrated by Professor L. R. Jones of the Vermont Experiment Station. Our experiments this season corroborate his results.

Formulas for the Bordeaux mixture have frequently been published, but even yet this valuable fungicide is not so largely used as it deserves to be. An extended discussion of methods of preparing it will be found in Bulletin 27 of this Station. In



Fig. 3. Egg Plant Leaf Injured by Flea-beetle.

brief, it may be made as follows: Dissolve 5 pounds of copper sulphate (blue vitriol) in 2 or 3 gallons of hot water, in an earthen or wooden vessel. Pour into a barrel or tank, holding 50 gallons, and add water enough nearly to fill it. Now slake 5 pounds of good, *fresh* lime in 2 or 3 gallons of water and pour into the barrel, straining through a sieve as it goes in. Mix the two thoroughly and the preparation is ready. In applying for flea-beetles or to any crop which is liable to injury by insects add 4 ounces of Paris green to each 50 gallons of Bordeaux mixture.

The second brood of flea-beetles appears upon potatoes during the last half of July, so that spraying about the middle of the month is likely to protect the plants from attacks.

METHODS OF APPLICATION

The Bordeaux mixture or lime and Paris green combination, to be used to advantage, must be sprayed upon the plants. There are many sorts of spray pumps now upon the market so that they are adapted to almost any conditions.

The simplest way of spraying low-growing plants, when only a comparatively small amount of it is to be done, is to use a small hand force pump in connection with a pail or bucket. There are many styles of these upon the market; one of the best, which I have used for some time in my own garden is shown in Fig. 4. These hand pumps range in price from \$3.00 to \$6.00 and are useful for many kinds of work.

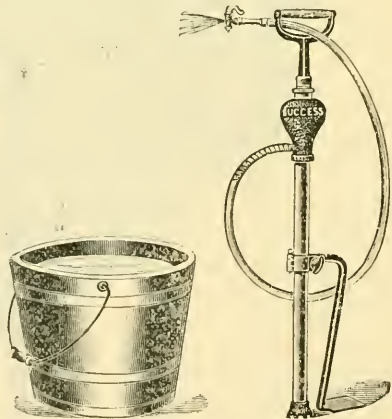


Fig. 4. Bucket Pump.

A very convenient spraying outfit for use in the garden and

on the home grounds is illustrated in Fig. 5. It is a home-made



Fig. 5. A Garden Sprayer.

affair, easily gotten up by any one handy with tools. The idea of the outfit originated with Prof. L. H. Bailey.

The knapsack spraying pumps (Fig. 6) are handier for use in the garden than the bucket pumps, but cost considerably more. As will be seen from the figure the tank is strapped on the operator's back leaving him free to pump with one hand and manipulate the nozzle with the other. Using a knapsack sprayer is hard work, however, and is not advisable where barrel outfits drawn by a horse can as well be used.



Fig. 6. The Knapsack Sprayer.

639.73 N53 1 cop

New Hampshire

Bulletins 1-48

--	--	--	--

